

## PRELIMINARY STATEMENT OF TORNADES IN THE UNITED STATES DURING 1931

By HERBERT C. HUNTER

(Weather Bureau, Washington, February 2, 1932)

## TORNADES AND PROBABLE TORNADES

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Number.....	3	0	5	2	12	20	11	11	12	4	4	5	89
Deaths.....	2	3	0	0	2	2	0	1	5	0	0	14	34
Damage <sup>1</sup> .....	48	---	115	6	272	215	39	135	828	80	18	72	1,826

TORNADIC WINDS AND POSSIBLE TORNADES <sup>2</sup>

	0	0	0	1	0	1	0	0	1	0	0	0	3
Number.....	0	0	0	1	0	1	0	0	1	0	0	0	3
Deaths.....	---	---	---	0	---	0	---	---	0	---	---	---	0
Damage <sup>1</sup> .....	---	---	---	2	---	25	---	---	3	---	---	---	30

<sup>1</sup> In thousands of dollars.<sup>2</sup> Some of these, in the final study, may be classed as not tornadoes.

In advance of the final study of windstorms of 1931, which probably will be finished during next summer, and in accordance with the practice of recent years, a preliminary statement is made in the December issue of the REVIEW of the results derived from information secured through the assistance of many observers, especially the several sections directors. Practically all this material has been employed in compiling the monthly tables of "Severe Local Storms."

The number of tornadoes and the damage they caused were considerably less than for any other recent year, and it is especially gratifying that the loss of life was less than half the least in any of the preceding 15 years. The greatest loss of any month was in December although this usually is the season of least tornado activity.

## THE WEATHER OF 1931 IN THE UNITED STATES

By HERBERT C. HUNTER

The year was marked by unusual warmth over the greater part of the country, and was somewhat warmer than normal in all but a very few small areas. Temperatures were particularly above normal in the months usually styled the winter months—December, January, and February—also considerably in the autumn months and July.

Of the 12 months only March averaged cooler than normal, on the basis of the district departures shown in Table 1, although May was practically normal in the country as a whole.

The accompanying temperature-departure chart, like the right-hand column of Table 1, indicates that the north-central portion of the country had the greatest positive departure for the year as a whole, as it also had in 1930, 1928, and 1921. In general, 1931 and 1921 were the warmest years experienced in the United States during a considerable period.

The smallest departures were found in the Florida Peninsula and the Southern Slope. Indeed, the former averaged more than half a degree below normal temperature during the 11-month period, January to November, but the warmest December of record succeeded, making the district temperature average for the entire year slightly above normal.

The precipitation was deficient in the country as a whole, but to a considerably less extent than in 1930. Once more the Florida Peninsula shows the largest excess

for the year, but a considerably smaller excess than for 1930. The Southwest recorded more precipitation than normal, particularly the South Pacific district. The Middle Atlantic, Ohio Valley, and North Pacific districts, where 1930 saw marked deficiencies, experienced deficiencies also in 1931, as a whole; but shortages were less, particularly in the Ohio Valley and the North Pacific areas; also the distribution from month to month was not so unfavorable.

The South Atlantic district had a considerable shortage, notably during the 6-month period, June to November. The Northern Slope and North Dakota had marked deficiencies of rainfall starting in April and lasting through substantially all the months of the growing season.

During every month several districts received greater precipitation than normal and several others less than normal. As Table 2 indicates, the month of June had the greatest deficiency over the country as a whole, though February and May likewise fell short to a considerable extent. December alone showed an excess more than very slight, when all the districts were averaged.

It should be remarked that the two charts and the tables are based on reports from about 200 Weather Bureau stations and that a larger number and better distribution of the reporting stations would probably give a somewhat different result, especially as to the areas of positive and negative departures.

TABLE 1.—Monthly and annual temperature departures, 1931

District	January	February	March	April	May	June	July	August	September	October	November	December	Average
New England.....	+1.1	+1.7	+3.6	+2.7	+1.6	+0.8	+2.0	+1.4	+3.4	+3.7	+6.4	+3.7	+2.7
Middle Atlantic.....	+2.5	+2.9	-0.7	+0.1	+0.1	+0.6	+2.9	+0.7	+5.1	+3.4	+7.7	+7.2	+2.7
South Atlantic.....	+0.5	+1.1	-4.1	-1.4	-1.7	+0.9	+2.7	+0.1	+4.1	+2.8	+6.5	+8.5	+1.7
Florida Peninsula.....	-3.1	-1.8	-5.4	-1.8	-0.1	+0.5	+1.6	+0.9	+0.4	+0.9	+1.7	+8.3	+0.2
East Gulf.....	-0.4	+1.1	-5.4	-1.9	-2.8	+1.7	+1.4	-1.2	+4.1	+3.5	+6.8	+8.2	+1.3
West Gulf.....	+2.2	+3.7	-5.5	-3.9	-3.6	+0.9	+0.6	-1.2	+4.5	+5.9	+6.5	+3.0	+1.1
Ohio Valley and Tennessee.....	+3.0	+4.3	-4.3	-0.1	-2.7	+2.0	+3.1	-0.4	+5.2	+3.3	+9.0	+8.4	+1.3
Lower Lakes.....	+2.6	+4.4	+1.2	+1.8	0.0	+0.9	+4.0	+1.7	+5.5	+4.2	+9.1	+6.7	+3.5
Upper Lakes.....	+6.4	+9.6	+2.2	+2.1	-0.5	+3.1	+4.2	+1.7	+6.1	+5.4	+8.7	+8.1	+4.8
North Dakota.....	+16.4	+20.4	+3.7	+3.8	-0.5	+5.5	+2.6	+1.5	+5.1	+4.6	+3.9	+9.1	+6.3
Upper Mississippi Valley.....	+9.4	+11.6	-0.3	+2.3	-3.0	+5.3	+3.8	+0.7	+6.9	+5.3	+9.2	+10.3	+6.1
Missouri Valley.....	+11.1	+12.8	-1.1	+1.7	-2.5	+6.7	+3.6	+0.8	+7.5	+4.6	+5.3	+7.8	+4.9
Northern Slope.....	+10.1	+11.0	+1.2	+1.5	+0.9	+5.5	+3.2	+2.6	+3.4	+2.8	-2.4	+1.1	+3.4
Middle Slope.....	+6.8	+8.2	-4.0	-1.0	-2.6	+4.9	+2.6	-0.1	+7.9	+4.7	+1.8	+5.6	+2.9
Southern Slope.....	+1.7	+3.8	-5.4	-4.1	-3.9	+1.6	0.0	-0.6	+6.4	+5.5	+2.7	-0.1	+0.6
Southern Plateau.....	+1.4	+2.4	+1.2	+3.1	+2.8	+1.4	+3.9	+0.8	+2.2	+2.9	-1.9	-2.6	+1.5
Middle Plateau.....	+0.2	+3.6	+0.2	+2.3	+3.3	+3.9	+6.1	+3.5	+1.0	+3.8	-4.3	-5.1	+1.5
Northern Plateau.....	+3.5	+2.1	+0.6	+0.6	+4.2	+2.0	+4.1	+3.2	+1.1	+1.6	-4.1	-3.3	+1.3
North Pacific.....	+5.4	+3.0	+2.3	+3.6	+4.0	+0.9	+2.0	+0.6	+1.0	+1.0	-2.4	-0.4	+1.8
Middle Pacific.....	+2.0	+3.5	+3.7	+4.1	+5.4	+1.5	+4.2	+1.3	-0.3	-0.6	-2.9	-1.8	+1.7
South Pacific.....	+3.9	+4.1	+5.8	+6.0	+5.7	+2.3	+6.3	+4.6	+1.3	+2.6	-2.0	-1.1	+3.3
United States.....	+4.1	+5.4	-0.5	+1.0	+0.2	+2.5	+3.1	+1.1	+3.9	+3.4	+3.1	+3.9	+2.6

1 Annual departure.

TABLE 2.—Precipitation departures, monthly and annual, 1931

District	January	February	March	April	May	June	July	August	September	October	November	December	Sum
New England.....	-0.4	-1.0	+0.7	-0.2	+0.8	+2.1	+0.5	+0.1	-0.4	0.0	-2.1	-0.2	-0.1
Middle Atlantic.....	-1.4	-1.4	+0.1	-0.3	+0.9	-0.4	+0.6	+1.0	-1.2	-1.4	-1.9	-1.1	-6.5
South Atlantic.....	-1.2	-1.8	-0.2	-0.4	+0.6	-2.4	-0.3	-0.4	-3.0	-2.5	-1.9	+2.3	-11.2
Florida Peninsula.....	+2.4	+0.7	+3.8	+3.0	-0.9	-5.0	-1.2	-0.7	+5.3	-1.1	-1.3	+0.4	+5.4
East Gulf.....	-1.4	-1.9	-1.2	-1.7	-0.9	-2.8	+1.4	+0.7	-2.9	-0.9	-1.6	+3.9	-9.3
West Gulf.....	+0.6	+1.2	0.0	-0.7	-2.2	-1.2	+0.2	-0.3	-2.5	-0.6	+0.1	+2.2	-3.2
Ohio Valley and Tennessee.....	-2.6	-0.6	-1.4	-0.2	-0.5	-0.8	+0.5	+0.4	+0.4	-0.1	+0.1	-1.7	-3.1
Lower Lakes.....	-0.5	-1.0	-0.5	+0.3	+0.2	-0.7	-0.4	-0.4	+0.3	-0.7	-0.4	0.0	-4.0
Upper Lakes.....	-0.7	-0.8	+0.2	-1.1	-0.3	0.0	-0.6	-0.8	+1.4	+0.2	+1.1	-0.3	-1.7
North Dakota.....	-0.4	-0.1	+0.3	-1.2	-1.0	-1.4	+0.4	-0.2	+0.2	+0.3	-0.1	-0.1	-3.3
Upper Mississippi Valley.....	-1.0	-0.6	-0.1	-0.8	-1.1	-0.1	-1.1	+0.1	+0.9	+0.5	+3.0	+0.6	+0.3
Missouri Valley.....	-0.6	-0.2	0.0	-0.9	-0.5	-2.0	-1.2	+1.0	+0.2	-0.2	+3.2	+0.9	-0.3
Northern Slope.....	-0.6	-0.3	0.0	-0.6	-1.2	-0.9	-0.3	-0.6	0.0	-0.3	+0.2	-0.3	-4.9
Middle Slope.....	-0.4	+0.2	+0.6	+0.3	-0.8	-1.6	-1.4	-0.2	-0.6	-0.6	+2.5	-0.3	-2.3
Southern Slope.....	+1.0	+0.9	+0.1	+0.9	+0.1	-0.8	-0.8	-0.4	-2.4	+1.1	+0.8	+0.7	+1.2
Southern Plateau.....	-0.3	+0.7	-0.2	+0.8	-0.3	+0.2	-0.8	+0.8	+0.6	-0.2	+0.6	+0.1	+2.0
Middle Plateau.....	-0.6	-0.4	-0.5	+0.1	-0.5	-0.1	-0.1	-0.1	+0.1	-0.2	+0.6	+0.2	-1.5
Northern Plateau.....	-0.5	-0.7	+1.1	-0.6	-1.2	-0.2	-0.4	-0.4	0.0	-0.2	+0.1	+0.8	-2.2
North Pacific.....	0.0	-1.7	+1.5	-0.3	-1.3	+0.3	-0.6	-0.6	+0.9	0.0	-0.9	+0.8	-1.9
Middle Pacific.....	-0.2	-2.4	-2.0	-1.3	-0.1	+0.3	0.0	0.0	-0.5	-0.5	0.0	+3.7	-3.0
South Pacific.....	+1.1	+0.5	-1.9	+0.8	+0.3	+0.3	0.0	0.0	-0.1	-0.6	+0.9	+2.3	+3.6
United States.....	-0.4	-0.5	0.0	-0.2	-0.5	-0.8	-0.3	-0.1	-0.2	-0.4	+0.1	+0.9	-2.4

## BIBLIOGRAPHY

C. FITZHUGH TALMAN, in charge of Library

## RECENT ADDITIONS

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

## American national red cross.

Texas tornadoes and storms of May, 1930. 6 p. m. 28 cm. [Manifolded.]

## Bentley, W. A., &amp; Humphreys, W. J.

Snow crystals. 1st ed. New York. 1931. ix, 227 p. incl. front., illus. plates. 31½ cm.

## Bongards, H.

Lambrechts graphische Psychrometertafel für starkbewegte Luft. Luftgeschwindigkeit  $\geq 2$  m. p. s. n. p. n. d. chart (folded.) 22½ x 26½ cm.

## Hannay, A. M., comp.

Influence of weather on crops: 1900-1930. A selected and annotated bibliography. [Washington. 1931.] 246 p. 23½ cm. (U. S. Agric. dept. Misc. pub. no. 118.)

## Lindskog, Erik.

On the geographical distribution of fog in Sweden. n. p. n. d. 94 p. figs. 25 cm. (Georg. annaler. H. 1, 1931.)

## Mellor, H. B., &amp; others.

Studies of ultra-violet in daylight. 17 p. illus. 23 cm. (Paper presented before the silver anniv. conven. of the Illum. engin. soc., Pittsburgh, Pa., Oct. 13-16, 1931.)

## Nichols, L. H.

Fourth report to the Quebec forest industries association, limited. The burning of settler's slash and meteorological conditions in the province of Quebec during 1931. Quebec. 1931. 22 p. plates. charts. 28 cm.

## Peppler, W.

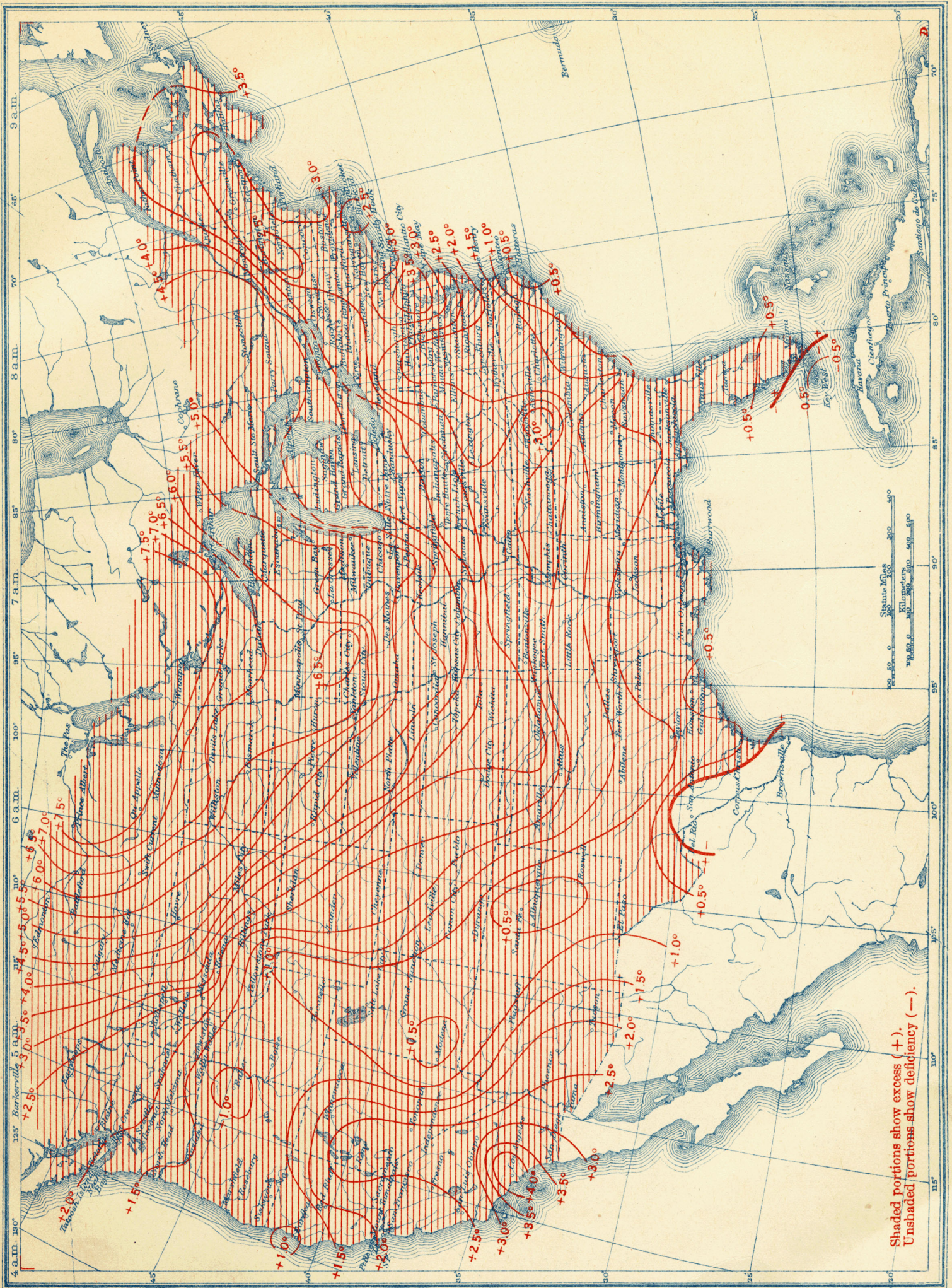
Ergebnisse der mehrjährigen Messungen der Ortshelligkeit am Bodensee. p. 157-189. figs. 23 cm. (Sonderab.: 57. Hefte der Schrift. des Ver. für Gesch. des Bodensees und seiner Umgebung.) (Arbeiten der Drachenstation am Bodensee.)

## Prochnow, Oskar.

Wolken. Berlin. [c. 1931.] 32 p. illus. 21 cm. (Die Brehm-Bücher Bd. 9.)



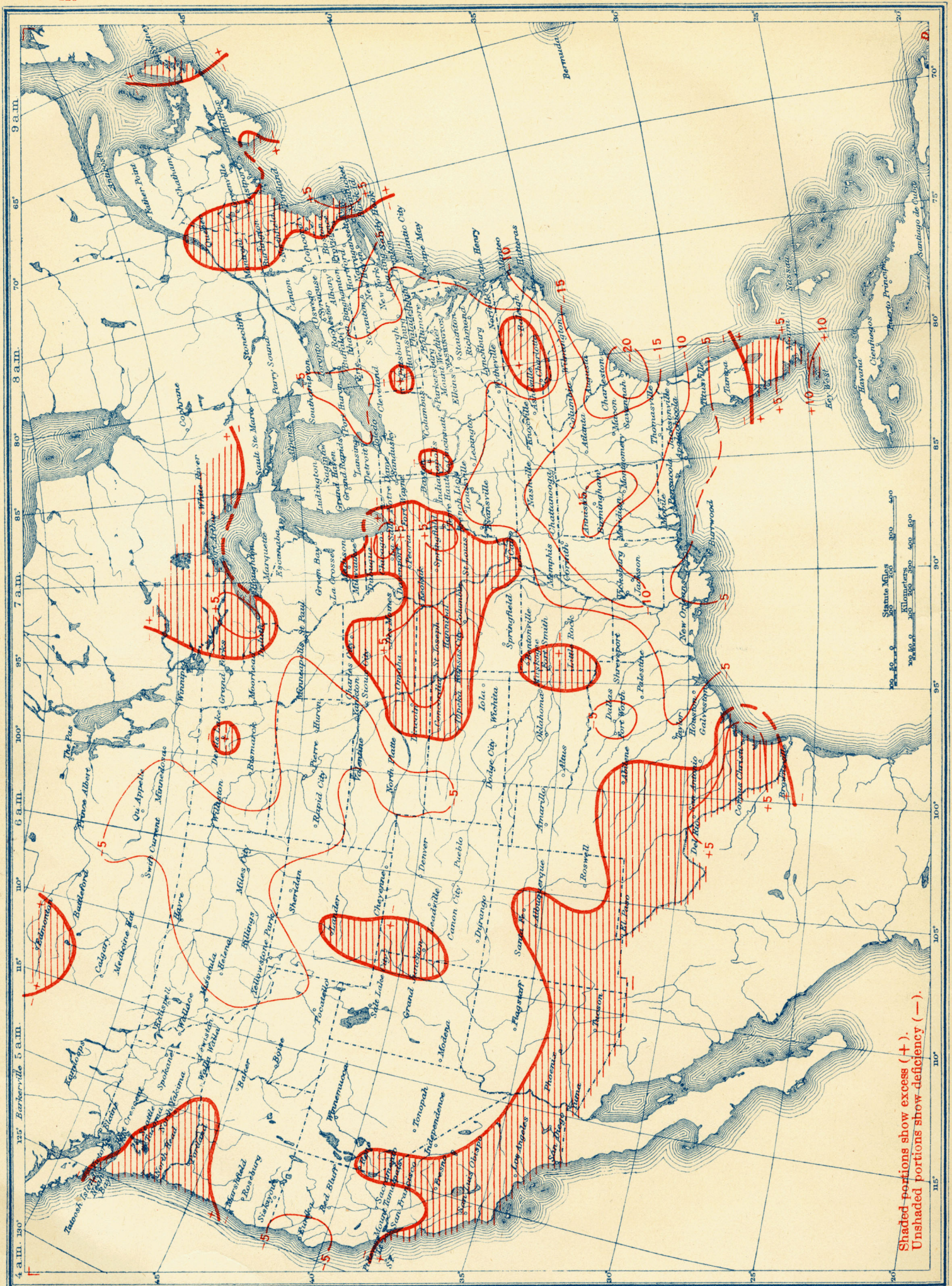
I. Annual Temperature Departures (°F.) in the United States, 1931



Shaded portions show excess (+).  
Unshaded portions show deficiency (-).



## II. Annual Precipitation Departures (inches) in the United States, 1931



Shaded portions show excess (+).  
Unshaded portions show deficiency (-).